PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-126536

(43)Date of publication of application : 11.05.1999

(51)Int.Cl. H01H 13/04

H01H 11/00

H01H 13/02

H01H 13/14

H01H 13/70

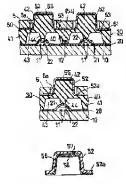
(21)Application number : 09-308118

(22)Date of filing : 23.10.1997

(71)Applicant : SHIN ETSU POLYMER CO LTD

(72)Inventor : KIYOZAWA MIKIO
NAKANO SADAO
TANAKA KIYOBUMI
MORITA YUSUKE

(54) COVER MEMBER FOR PUSH BUTTON SWITCH AND PUSH BUTTON SWITCH



(57)Abstract:

PROBLEM TO BE SOLVED: To provide a cover member for push button switches which gives hard finger touch feeling and provides the wide option of setting the resilient elastic properties and has good durability for repeated use and to provide a push button switch.

SOLUTION: A light shielding colored layer 56 is formed on a hard resin sheet of a thermoplastic resin such as polyvinyl chloride resin, a display part 57 is formed by removing the light shielding colored layer 56 in a latter shape by laser, and then a light transmissive colored layer 58 is formed on the display part 57. After that, a key top 52 having the display part 57 in the inner bottom face is formed by pneumatic forming and further cut parts 53 are formed in the surrounding of the key top 52 while leaving a part of the surrounding to give a top sheet 50. On the other hand, a cover substrate 40 having a movable projected part 42 is formed from a silicone rubber composition by compressive molding, an adhesive 55 is applied to the top face of the movable projected part 42 of the cover substrate 40, and the movable projected part 42 is fitted with the key top 52 to stick and fix the inner bottom face of the key top 52 and the top face of the movable projected part 42 and in this manner, the cover substrate 40 and the top sheet 50 are assembled to give a cover member 30.

LEGAL STATUS

[Date of request for examination] 13.02.2004

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]

[Claim 1] Corresponding to two or more movable heights of said covering base, bulge shaping of the covering base of the rubber elasticity object which has two or more movable heights in one, and two or more keytops which have a display on the inside or external surface of a top panel is carried out. The top sheet of the rigid resin which is made to carry out fitting of said keytop to said movable heights, respectively, and is attached with said covering base, The covering

member for a push button switch which is a covering member for a preparation ****** switch, and is characterized by forming slitting in the surroundings of the keytop of said top sheet over the range of 340 degrees or more focusing on this keytop.

[Claim 2] The covering member for a push button switch according to claim 1 which pasted up only the top panel of said covering base, and the base in a keytop of said top sheet with adhesives.

[Claim 3] The covering member for a push button switch which is a covering member for a push button switch equipped with the covering base of the rubber elasticity object which has two or more movable heights in one, and the keytop of the shape of a cap of the rigid resin by which fitting was carried out to two or more movable heights of this covering base, respectively, and is characterized by pasting up only the movable heights top panel of said covering base, and the base in said keytop with adhesives.

[Claim 4] Claim 1 which said keytop is translucency and equips the inner base of this keytop with the display by which printing formation of a notation and the graphic form was carried out, the covering member for a push button switch according to claim 2 or 3.

[Claim 5] Claim 1 which said covering base and said keytop are translucency, and formed the protection-from-light nature coloring layer in the front face of said covering base, removed the protection-from-light nature coloring layer on said heights top panel in the notation and the graphic form configuration, and formed the display, the covering member for a push button switch according to claim 2 or 3.

[Claim 6] The covering base of the rubber elasticity object with which two or more movable heights were really formed is attached to the circuit board. Fitting of the top sheet of rigid resin or the cap-like keytop is carried out to said movable heights, respectively. In the push button switch which said covering base and circuit board are held [switch] in switch casing, and makes the amount of [of said top sheet or a keytop] point project out of switch casing The push button

switch characterized by pasting up only the top panel of said covering base, and the base in said keytop with adhesives while really forming a flange in the said top sheet or end face side of a keytop and compressing this flange between said covering bases and said switch casing.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the covering member for a push button switch used for data entry units, switching equipment, etc., such as mobile communication equipment, as components, and the push button switch using this covering member, especially, it prepares the film of rigid resin for a covering member in the front-face side of the base of a rubber elasticity object, constitutes a covering member, and relates to the covering member for a push button switch and push button switch which aim at the improvement of a feeling of finger touch.

[0002]

[Description of the Prior Art] The data entry unit of mobile communication equipment, such as a portable telephone, the keyboard of a personal computer,

etc. attach directly the covering member which usually consists of rubber elasticity objects, such as silicone rubber, (push button switch) to the circuit board, and are constituted. such a covering member -- usually the same as that of keytop arrays, such as a keyboard, and the keytop section of the same number (the number of conventions) -- having -- the rear face of these keytop section -- a traveling contact -- moreover, a graphic form, an alphabetic character, etc. are printed by the top panel of the keytop section.

[0003] By the way, the covering member mentioned above is in the condition which was attached with the circuit board and constituted the push button switch, and functions as a control unit (press side) to which the top panel of the keytop section contacts an operator's finger. For this reason, when a push button switch was used over a long period of time, a graphic form, an alphabetic character, etc. of a top panel of a keytop wore out in contact on an operator's finger, the visibility of a graphic form etc. may be spoiled and there was a fault that a good feeling of finger touch could not be obtained from the keytop section being elastic rubber.

[0004] then, an improvement of the abrasion resistance of an alphabetic character, a graphic form, etc. -- ** -- the covering member which aimed at both improvements of a feeling of finger touch is proposed variously, and what was indicated by JP,7-302526,A, JP,6-267367,A, or JP,8-69727,A is known as this kind of a covering member. For example, two or more bends are formed in resin films, such as polyethylene terephthalate (PET), it is poured in and filled up with melting resin, such as a polycarbonate, in these bends, and the covering member which makes it come to harden this melting resin is indicated by JP,7-302526,A.

[0005] Moreover, heights are formed in a resin film at JP,6-267367,A and JP,8-69727,A, while carrying out restoration hardening of the synthetic resin and making it unify in these heights, it leaves the hinge region of small width for the perimeter of the heights of a resin film, the notching section is formed, the face plate of the resin with which the hole which inserts in the resin film convex section was formed is pasted together, and a wrap covering member is indicated

by this face plate in the notching section.

[0006]

[Problem(s) to be Solved by the Invention] However, since each covering member given in each official report mentioned above formed a crevice (heights, bend) in a resin film and was filled up with resin in this crevice, the impact-resilience property and the feeling of a click to press actuation of a keytop had the small degree of freedom of selection of operating characteristics depending on the elasticity of a resin film, and it had the problem that the endurance over repeat use was also inferior.

[0007] That is, it was difficult to obtain the feeling of actuation which rubber elasticity must not be obtained, but the stroke which can be set up depending on resin films, such as PET, must also be restricted greatly, and the degree of freedom of a design should fall, and must make a stroke very small for acquiring considerable endurance, and should be satisfied. This invention was made in view of the above-mentioned problem, and on the occasion of a setup of an impact-resilience property, a feeling of a click, etc. to press actuation of a keytop, its degree of freedom of selection is large, and it aims at offering a push button switch to the covering member for a push button switch from which a good feeling of actuation is obtained.

[0008]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, invention according to claim 1 Corresponding to two or more movable heights of said covering base, bulge shaping of the covering base of the rubber elasticity object which has two or more movable heights in one, and two or more keytops which have a display on the inside or external surface of a top panel is carried out. The top sheet of the rigid resin which is made to carry out fitting of said keytop to said movable heights, respectively, and is attached with said covering base, It is a covering member for a preparation ****** switch, and slitting was formed in the surroundings of the keytop of said top sheet over the include-angle range of 340 degrees or more focusing on this keytop.

[0009] And invention according to claim 2 comes to paste up only the top panel of said covering base, and the base in a keytop of said top sheet with adhesives in the covering member for a push button switch according to claim 1.
[0010] Moreover, invention according to claim 3 is a covering member for a push button switch equipped with the covering base of the rubber elasticity object which has two or more movable heights in one, and the keytop of the shape of a cap of the rigid resin by which fitting was carried out to two or more movable heights of this covering base, respectively, and pasted up only the movable heights top panel of said covering base, and the base in said keytop with adhesives.
[0011] And in claim 1 and the covering member for a push button switch according to claim 2 or 3, invention according to claim 4 comes to carry out printing formation of the displays, such as a notation and a graphic form, on the inner base of this keytop while making said keytop translucency. Moreover, in claim 1 and the covering member for a push button switch according to claim 2 or 3, invention according to claim 5 formed the protection-from-light nature coloring layer in the front face of said covering base, removed the protection-from-light nature coloring layer on said heights top panel in the notation and the graphic form configuration, and formed the display while it constituted said covering base and said keytop in translucency.
[0012] A push button switch is constituted considering the circuit board, a covering base, and the top sheet (keytop) of rigid resin as main elements, and is held in casing, such as the device prepared, for example, a portable telephone, and a keyboard. When a stationary contact, a well-known circuit element, etc. constitute an illumination type push button switch again, emitters, such as LED, are prepared in the circuit board. Casing has the hole of the number of keys and the same number (the number of conventions mentioned above) for data inputs, and the keytop of a top sheet projects in these holes.
[0013] A covering base is attached to the circuit board through the click plate with which the dome section which has the skirt-board section of the thin meat which

continues the movable heights, these movable heights, and the base section of the number of conventions which projects from the base section which functions as the bearing section to the circuit board, and the base section etc., and has direct or an elastic deformation characteristic like a pan spring was formed. When this covering base is attached to the circuit board through a click plate, and the press section is directly attached to the circuit board by one again, the stationary contact of the circuit board and the traveling contact which can be contacted are formed in the rear face of movable heights by conductive rubber etc.

[0014] Moreover, rubber elasticity objects (constituent), such as thermoplastic elastomer of synthetic rubber and natural rubber, such as polyurethane rubber, acrylic rubber, isobutylene-isoprene-rubber, silicone rubber, polyisoprene-rubber, and ethylene-propylene-diene ternary polymerization (EPDM), thermoplastic elastomer, a polyester system, or an urethane system, are used for a covering base, especially when it constitutes an illumination-type push button switch, the rubber constituent of translucency is used, and it is independently fabricated with compression molding, injection molding, etc. by the insert molding which considers a keytop (top sheet) as an insertion.

[0015] Especially when a display is prepared in a keytop and it constitutes an illumination-type push button switch Constitute a covering base from a rubber elasticity object of translucency, and a keytop thru/or a top sheet are further used as the Imperial-Household resin of translucency. A display is formed in the inner base of a keytop by printing etc. before that shaping, and a translucency coloring layer is formed in formation or the agenesis part of this protection-from-light nature coloring layer for a protection-from-light nature coloring layer except for a part of part [at least] which meets the movable heights top panel of a covering base. When similarly a display is prepared in a covering base and it constitutes an illumination-type push button switch, laser etc. removes the protection-from-light nature coloring layer of a movable heights top panel a notation and in the shape of a graphic form, and a display is formed.

[0016] Formation of the display to a covering base extracts the protection-from-light nature coloring layer of a movable heights top panel in configurations, such as an alphabetic character, by laser radiation etc., after forming a protection-from-light nature coloring layer by spray painting etc. all over a front face, and after forming by a spray etc. all over this thing [extracting and forming a translucency coloring layer in the section], or a base front face, it is performed by removing the part on movable heights by laser etc. Moreover, formation of the display to a keytop forms a protection-from-light nature coloring layer in a rigid resin sheet in the state of a long picture, configurations, such as an alphabetic character, extract it, and it extracts and forms by alphabetic printing etc., and after [this] extracting and forming a translucency coloring layer in the section by printing etc., it performs the section laser radiation, by forming a keytop by pressure forming etc., etc.

[0017] the top sheet of rigid resin -- the sheet (film) of thermosetting resin or thermoplastics -- desirably, from the ease of shaping etc., resin sheets, such as the sheet of thermoplastics, for example, a PET sheet, polyethylene, a vinyl chloride, styrol, an acrylic, polypropylene, and a polycarbonate, and especially when it constitutes an illumination-type push button switch, the sheet of translucency is used. When not forming displays, such as a notation and a graphic form, in the movable heights top panel of a covering base, the top sheet of this rigid resin After forming a display by printing etc., by the vacuum forming, pressure forming, or press forming, the keytop of the cap (concave or convex)-like number of conventions etc. locates a display in an inner base (rear face), and is formed. Moreover, when forming a display in the movable heights top panel of a covering base, a keytop is formed, without forming a display.

[0018] A keytop is a cap-like, i.e., the shape of a cylinder like object with base to which the closedown of the front-face side was carried out, and the movable heights of a covering base **** it with fitting or considerable path clearance, and it is attached in a covering base in the condition. A part of independent condition that the keytop was completely separated from the film by punching etc., and

circumference [at least] are continuously formed in the condition that other parts are in the sheet condition separated by slitting, and left the condition that slitting was desirably formed over the include-angle range of 340 degrees or more, or the continuation section, 1mm - 2mm. An inner base is as desirable as the top panel of movable heights at least, and, as for this keytop, (the part excluding the medial surface if it put in another way, since deformation of a flank was permitted) pastes up only an inside with a movable heights top panel and adhesives, and various kinds of surface treatment, such as formation of the decoration layer for a rebound ace court, embossing, or an ornament, is performed to a front face if needed.

[0019] and -- the condition of having completed as a push button switch -- a keytop -- the outside of casing from the hole of casing -- press -- it projects operational. Especially the keytop of a top sheet that has a flange as a desirable mode pastes up only an inner base with the movable heights top panel of a covering base, and where a flange is pinched between casing and a covering base, it is attached.

[0020]

[Function] In order that the front face of the covering base of a rubber elasticity object may be made to fix with movable heights and the covering member for a push button switch concerning this invention may prepare in it the keytop fabricated from the top sheet or rigid resin which has a keytop, it can obtain a feeling of hard finger touch, and its degrees of freedom of a setup, such as an impact resilience property, are also large, and the endurance which was excellent also to use of a repeat is acquired further. That is, a hard feeling of finger touch is obtained by the keytop, and in order to acquire an impact-resilience property etc. with the covering base of a rubber elasticity object, a proper impact-resilience property can be attained and the outstanding feeling of a click and endurance are acquired.

[0021] If slitting 320 degrees or more is especially formed and put in another way around a keytop, by making it continue in the continuation section (hinge region)

20 degrees or less Effect deformation of a top sheet (rigid resin sheet) affects an impact-resilience property etc. can be made smaller. A keytop by among those, the thing which it is made to paste up with adhesives and is established only for a base and the movable heights top panel of a covering base Since deformation of the flank of a keytop is permitted, a more proper impact-resilience property can be acquired. In addition, the width of face of the above-mentioned continuation section has 1mm - 20mm more desirable than the endurance of a top sheet, and the workability at the time of with a group. Furthermore, the endurance which could prevent the wear of a display and was excellent in preparing a display in the movable heights top panel covered with the inner base of a keytop or a keytop at the display is acquired.

[0022] Furthermore, since the push button switch concerning this invention forms a flange in a top sheet and pinches this flange between casing and a covering base, even when high airtightness and watertightness are acquired and being constituted at an illumination ceremony, it can prevent that the light which LED inside casing etc. emits is revealed.

[0023]

[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is explained with reference to a drawing. It is drawing in which drawing 4 shows the covering member for a push button switch concerning the gestalt of implementation of one of this invention, and drawing 1 shows the mode of everything [drawing 4 / the type section Fig. of the push button switch using this covering member, drawing in which drawing 2 shows a covering base, drawing in which drawing 3 shows a rigid resin sheet, and] but a rigid resin sheet from drawing 1 .

[0024] First, the covering member manufactured with reference to drawing 1 is explained. Drawing 1 shows the condition of having attached as a push button switch, and, for five, as for the circuit board and 20, casing of a device and 10 are [a click plate and 30] covering members among drawing. As everyone knows, casing 5 has two or more hole 5a which the keytop mentioned later penetrates,

and the circuit board 10 consists of an epoxy resin etc., and it has the emitters 12, such as a stationary contact 11 and LED, on a front face. Corresponding to the movable heights which the covering member 30 mentions later, bulge formation of two or more dome sections 21 which have an elastic deformation characteristic with the click plate 20 like a pan spring is carried out at a front-face side, and a traveling contact 22 is formed in the rear face of the dome section 21. The press section of the covering member 30 contacts the surface crowning of the dome section 21, the dome section 21 deforms this click plate 20 by the press by the press section, and a traveling contact 22 contacts a stationary contact 11.

[0025] The covering member 30 attaches the top sheet 50 of the rigid resin of translucency to the front face of the covering base 40 of translucency in the shape of a plane view rectangle, is constituted, and has the key of the numbers of conventions, such as a figure, a function, and scrolling. As shown in drawing 2 a and b, the covering base 40 is fabricated by compression molding, injection molding, etc. of a silicone rubber constituent, and equips one with the base section 41 as the bearing section to the circuit board 10, and the movable heights 42 of the number of conventions which follows the base section 41 through a thin-walled part 43. This covering base 40 fits into the keytop of the top sheet with which the movable heights 42 make and mention abbreviation tubed later, and the press section 44 protrudes on the rear face of each movable heights 42 possible [press of the dome section 21] at one. This covering base 40 is fabricated with compression molding, injection molding, etc. using a silicone rubber constituent.

[0026] A plane view configuration has the shape of a rectangle of the covering base 40 and abbreviation identitas, and the top sheet 50 is constituted from thermoplastics sheets, such as PET, polyethylene, or a polyvinyl chloride, by pressure forming etc. As shown in drawing 3 a, b, and c, the keytop 52 of the number of conventions is fabricated by the sheet section 51 (part except a keytop), around these keytops 52, it cuts deeply in the range except the include

angle theta of 20 degrees or less, and 53 is formed in the top sheet 50 of ****** (the part which the range of an include angle theta follows is called a hinge region 54). The movable heights 42 have the shape of a cap of a convex at the front-face side which fits in, and, as for a keytop 52, flange 52a is formed of slitting 53.

[0027] Moreover, the protection-from-light nature coloring layer 56 is formed all over a rear face, the protection-from-light nature coloring layer 56 of the base in a keytop 51 is removed on the top sheet 50 a notation and in the shape of a graphic form, and a display 57 is formed in it, and the translucency coloring layer 58 is formed in this display 57 in piles. the protection-from-light nature coloring layer 56 is formed before shaping of a keytop 52 by printing, spray painting, etc. using ink and the coating (resin constituent) of protection-from-light nature with which pigments, such as carbon black, were blended, and a display 57 removes the protection-from-light nature coloring layer 56 in configurations, such as an alphabetic character, with laser -- or it extracts, it is formed by alphabetic printing etc., and the translucency coloring layer 58 is formed by screen-stencil etc. using the ink of translucency etc. In addition, in drawing 1 , drawing 5 a mentioned later, and drawing 6 , the publication of the protection-from-light nature coloring layer 56 or translucency coloring layer 58 grade is omitted.

[0028] The movable heights 42 of the covering base 40 fit into a keytop 52, respectively, and, as for this top sheet 50, adhesion immobilization of the inner base of a keytop 52 and the top panel of the movable heights 42 is carried out by adhesives 55. In addition, the hinge region 54 mentioned above can also be formed in two or more places, as the formation range is not limited to the include angle of 20 degrees or less and it is shown in drawing 4 . Furthermore, it is also possible a part for jointing of the top sheet 50 and the covering base 40 and for it not to be limited to the inner base of a keytop 52 and the top panel of the movable heights 42, and to paste up the sheet section 51 and the base 41 in addition to these parts, and also it is also possible to paste up the whole surface of the field which contacts.

[0029] If it is in the gestalt of this operation, as shown in drawing 1 , the movable heights 42 make a thin-walled part 43 transform by pressing a keytop 52, it displaces to a circuit board 10 side, and the press section 44 presses the dome section 21 of the click plate 20. For this reason, the dome section 21 deforms the click plate 20 in the property like a pan spring, a traveling contact 22 contacts a stationary contact 11, and a circuit is opened and closed. And deformation of the dome section 21 gives a proper feeling of resistance, and a feeling of a click to press actuation of a keytop 52 at this time.

[0030] here, only an inner base pastes up a keytop 52 with the movable heights 42 -- **** -- it does not pass and the sheet section 51 continues only by the hinge region 54. For this reason, when the movable heights 42 produce a variation rate, a hinge region 54 is made crooked and it displaces to the movable heights 42 and one, and a keytop 52 has excessive thrust, and when movable heights 42 the very thing produces a compression set, it produces deformation in which a flank bulges to the direction outside of a path. Therefore, the property of the variation rate of the movable heights 42, i.e., the press operating characteristics of a keytop 52, does not receive big effect in the variation rate of a keytop 52, and they can determine the impact-resilience property of a keytop 52 with the covering base 30 and the click plate 20, its degree of freedom of the setup can be large, and can also perform a setup in a desired property easily, and can also improve the endurance over use of a repeat further.

[0031] Moreover, if it is in this push button switch, the keytop 52 which an operator's finger etc. contacts directly consists of hard thermoplastics as compared with rubber, and printing formation is carried out on the inner base whose display 57 is the rear face of a keytop 52. For this reason, even if a hard feeling of finger touch is obtained and it uses it repeatedly, a display 57 does not wear out and high endurance is attained by the display 57.

[0032] Drawing 5 a and b shows the covering member for a push button switch concerning the gestalt of other operations of this invention, drawing 5 a is some type section Figs. of a push button switch, and drawing 5 b is the expansion type

section Fig. of a keytop. In addition, the same number is given to the same part as the gestalt of operation mentioned above in the gestalt of this operation, and the gestalt of operation mentioned later, and explanation and illustration are omitted.

[0033] The gestalt of this operation carries out fitting of each independent keytop 52 52, i.e., each keytop completely separated from the sheet section 51, to the movable heights 42 of the covering base 40, and pastes up the inner base of a keytop 52, and the top panel of the movable heights 42 with adhesives 55. The protection-from-light nature coloring layer 56 is formed in a rear face, the protection-from-light nature coloring layer 56 at the base of inner is removed in configurations, such as an alphabetic character, a display 57 is formed in a keytop 52, and the translucency coloring layer 58 is formed in a display 57 in piles. Moreover, a keytop 52 has flange 52a and this flange 52a is pinched between casing 5 and the covering base 40.

[0034] Even if it is in the gestalt of this operation, in order that a feeling of hard finger touch may be obtained since a keytop 52 is hard resin and a keytop 52 may not have big effect on an impact-resilience property, the degree of freedom of a property setup is large, and the outstanding endurance is acquired. In order that especially the gestalt of this operation may pinch flange 52a of a keytop 52 between the covering base 40 and casing 5, the watertightness which could prevent leakage of the light of LED of the casing 5 interior, and was excellent is acquired.

[0035] Moreover, as this covering member 30 is described below, it is manufactured. That is, after extracting the protection-from-light nature coloring layer 56 on a rigid resin sheet, forming in an alphabetic character condition and forming a display 57, the translucency coloring layer 58 is formed on a display 57, subsequently, a keytop 52 is fabricated by pressure forming etc. and a keytop 52 is pierced in the condition of following the sheet section 51 in the continuation section (hinge region 54) of very small width of face. And adhesives 55 are applied to each movable heights 42 top panel of the covering base 40, fitting of

the keytop 52 which followed each movable heights 42 by the hinge region 54 is carried out, and it pastes up, and after hardening of adhesives, a hinge region 54 is cut and the sheet section 51 is torn off. Therefore, easily, attachment of the keytop 52 to the covering base 40 can hold each keytop 52 in one with a fixture etc., can attach in coincidence, reduces a manufacture man day, and reduction of cost can be aimed at.

[0036] In addition, this invention is not limited to the gestalt of operation mentioned above, and can also attain the covering member 30 (push button switch) as shown in drawing 6 or drawing 7 . Namely, the covering member 30 shown in drawing 6 fabricates a keytop 52 in the configuration which does not have flange 52a, and attaches it in the movable heights 42 of the covering base 40. The whole surface of an inner base or a medial surface, and a top panel pastes up this keytop 52 on the movable heights 42 with adhesives 55.

[0037] Moreover, in the gestalt of operation of drawing 1 , not only the base in the keytop 52 of the rigid resin sheet 50 but the sheet section 51 pastes up the covering member 30 shown in drawing 7 with adhesives 55 (x shows among drawing) on the front face of the covering base 40. In order that the rigid resin sheet 50 may fix the gestalt of this operation firmly to the covering base 40, more excellent endurance and watertightness are acquired.

[0038]

[Effect of the Invention] As explained above, invention according to claim 1 While fabricating the covering base which has movable heights with a rubber elasticity object, carry out bulge shaping of the keytop at a rigid resin sheet, and a top sheet is constituted. In order to form slitting in the surroundings of the keytop of a top sheet in 320 degrees or more, to carry out fitting of the keytop to movable heights and to attach a top sheet in a covering base, Moreover, in order that invention according to claim 3 may attach in the movable heights of a covering base the keytop by which punching separation was carried out from the rigid resin sheet, Effect it not only can obtain a feeling of hard finger touch, but deformation of a keytop etc. affects an impact-resilience property on the occasion

of press actuation on the occasion of press actuation of a keytop can be made small, and the big degree of freedom to a setup of a property is obtained, and the fall of endurance to use of a repeat can also be prevented.

[0039] Since only the inner base of a keytop and the top panel of movable heights are especially pasted up with adhesives on the occasion of attachment of the covering base of a keytop according to invention given in claims 2 and 3, deformation of the flank of a keytop is permitted on the occasion of press actuation, and deformation of a keytop can make smaller effect which it has on an impact-resilience property etc.

[0040] Moreover, according to invention according to claim 6, when the flange was formed in the keytop, higher watertightness is acquired in order to pinch a flange between a covering base and casing, where a covering member is included in casing, and constituted as an illumination-type push button switch, leakage of light, such as LED in casing, can also be prevented more effectively.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] They are some type section Figs. of the push button switch

incorporating the covering member for a push button switch concerning the gestalt of implementation of one of this invention.

[Drawing 2] The covering base of the covering member for the said push button switch is shown, a is a ** type top view and b is the A-A view type section Fig. of a.

[Drawing 3] The rigid resin sheet of the covering member for the said push button switch is shown, and, for a, a part of ** type top view and b are [a ****** type top view and c] the B-B view type section Figs. of a.

[Drawing 4] other modes of this rigid resin sheet are shown -- it is a ****** type top view a part.

[Drawing 5] some of some type section Figs. of the push button switch with which the covering member for a push button switch concerning the gestalt of other operations of this invention was shown, and a incorporated the covering member for the said push button switch, and rigid resin sheets which b uses for this covering member -- it is an expansion type section Fig.

[Drawing 6] They are some type section Figs. of the push button switch incorporating the covering member for a push button switch of this invention which starts the gestalt of other operations again.

[Drawing 7] It is the type section Fig. which expanded some push button switches incorporating the covering member for a push button switch of this invention which starts the gestalt of other operations further.

[Description of Notations]

5 Casing

10 Circuit Board

12 LED (Emitter)

20 Click Plate

21 Dome Section

30 Covering Member

40 Covering Base

41 Base Section

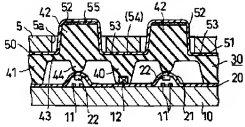
42 Movable Heights
43 Thin-walled Part
50 Top Sheet
51 Sheet Section
52 Keytop
52a Flange
53 Slitting
54 Hinge Region (Continuation Section)
55 Adhesives
56 Protection-from-Light Nature Coloring Layer
57 Display
58 Translucency Coloring Layer
theta Include angle of the formation range of slitting

[Translation done.]

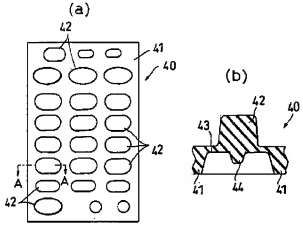
* NOTICES *

DRAWINGS

[Drawing 1]

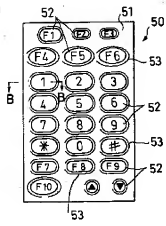


[Drawing 2]

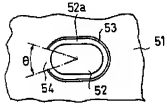


[Drawing 3]

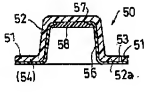
(a)



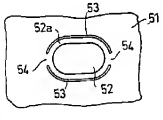
(b)



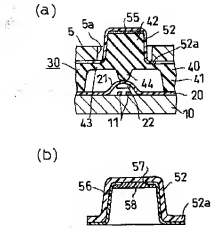
(c)



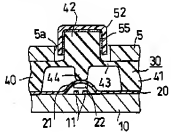
[Drawing 4]



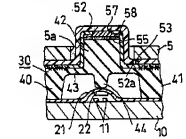
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Translation done.]

(19)日本国特許庁（ＪＰ）　(12) **公開特許公報（Ａ）**　(11)特許出願公開番号

特開平11－126536

(43)公開日　平成11年(1999)５月11日

(51)Int.Cl.⁶	識別記号	ＦＩ		
Ｈ０１Ｈ	13/04	Ｈ０１Ｈ	13/04	Ｂ
	11/00		11/00	Ｅ
	13/02		13/02	Ａ
	13/14		13/14	Ｚ
	13/70		13/70	Ｄ

審査請求　未請求　請求項の数６　ＦＤ　（全　８　頁）

(21)出願番号　特願平9－308118

(22)出願日　平成９年(1997)10月23日

(71)出願人　000190116
信越ポリマー株式会社
東京都中央区日本橋本町４丁目３番５号
(72)発明者　清澤　幹男
長野県松本市大字寿小赤758番地　しなのポリマー株式会社内
(72)発明者　中野　禎夫
長野県松本市大字寿小赤758番地　しなのポリマー株式会社内
(72)発明者　田中　清文
埼玉県大宮市吉野町１丁目406番地の１
信越ポリマー株式会社内
(74)代理人　弁理士　葉師　稔　（外１名）

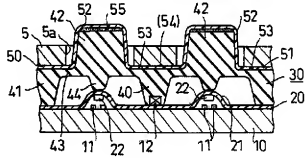
最終頁に続く

(54)【発明の名称】　押釦スイッチ用カバー部材および押釦スイッチ

(57)【要約】

【課題】　硬質指触感が得られ、また、反撥弾性特性の設定等に大きな自由度が得られ、さらに、繰り返し使用に対する耐久性にも優れた押釦スイッチ用カバー部材および押釦スイッチを提供する。

【解決手段】　ポリ塩化ビニル樹脂等の熱可塑性樹脂の硬質樹脂シート遮光性着色層５６を形成し、この遮光性着色層５６をレーザーにより文字等の形状に抜き加工して表示部５７を形成した後に表示部５７上に重ねて透光性着色層５８を形成し、次いで、圧空成形等で表示部５７が内底面に位置するキートップ５２を成形し、さらに、キートップ５２をその周りに一部を残して切り込み５３を形成し、トップシート５０を得る。また、シリコーンゴム組成物を用い圧縮成形等で可動凸部４２を有するカバー基体４０を成形し、カバー基体４０の可動凸部４２天面に接着剤５５を塗布し、可動凸部４２にキートップ５２を嵌合させてキートップ５２内底面と可動凸部４２天面とを接着固定することで、カバー基体４０とトップシート５０を組み付けてカバー部材３０を構成する。



【特許請求の範囲】
【請求項１】　複数の可動凸部を一体に有するゴム弾性体のカバー基体と、天面の内面または外面に表示部を有する複数のキートップが前記カバー基体の複数の可動凸部に対応して黔出成形され、前記キートップをそれぞれ前記可動凸部と嵌合させて前記カバー基体と組み付けられる硬質樹脂のトップシートと、を備える押釦スイッチ用カバー部材であって、
前記トップシートのキートップの周りに該キートップを中心として３４０°以上の範囲にわたって切り込みを形成したことを特徴とする押釦スイッチ用カバー部材。
【請求項２】　前記カバー基体の天面と前記トップシートのキートップ内底面のみを接着剤で接着した請求項１に記載の押釦スイッチ用カバー部材。
【請求項３】　複数の可動凸部を一体に有するゴム弾性体のカバー基体と、該カバー基体の複数の可動凸部にそれぞれ嵌合された硬質樹脂のキャップ状のキートップとを備える押釦スイッチ用カバー部材であって、
前記カバー基体の可動凸部天面と前記キートップ内底面のみを接着剤で接着したことを特徴とする押釦スイッチ用カバー部材。
【請求項４】　前記キートップが透光性であって、該キートップの内底面に記号・図形が印刷形成された表示部を備える請求項１、請求項２または請求項３に記載の押釦スイッチ用カバー部材。
【請求項５】　前記カバー基体および前記キートップが透光性であって、前記カバー基体の表面に遮光性着色層を形成し、前記凸部天面上の遮光性着色層を記号・図形形状に除去して表示部を形成した請求項１、請求項２または請求項３に記載の押釦スイッチ用カバー部材。
【請求項６】　複数の可動凸部が一体形成されたゴム弾性体のカバー基体を回路基板に組み付け、前記可動凸部にそれぞれ硬質樹脂のトップシートあるいはキャップ状のキートップを嵌合させ、前記カバー基体および回路基板をスイッチケーシング内に収容して前記トップシートあるいはキートップの先端部分をスイッチケーシング外へ突出させる押釦スイッチにおいて、
前記トップシートあるいはキートップの基端側にフランジ部を一体形成し、該フランジ部を前記カバー基体と前記スイッチケーシングとの間に挟圧するとともに、前記カバー基体の天面と前記キートップ内底面のみを接着剤で接着したことを特徴とする押釦スイッチ。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】この発明は、移動体通信機器等のデータ入力装置やスイッチ装置等に部品として用いる押釦スイッチ用カバー部材、および、このカバー部材を用いた押釦スイッチに係り、特に、カバー部材をゴム弾性体の基体の表面側に硬質樹脂のフィルムを設けてカバー部材を構成し、指触感の改善を図る押釦スイッチ用カバー部材と押釦スイッチに関する。
【０００２】
【従来の技術】携帯電話機等の移動体通信機器のデータ入力装置やパーソナルコンピュータのキーボード等（押釦スイッチ）は、通常、シリコーンゴム等のゴム弾性体からなるカバー部材を回路基板に直接に組み付けて構成される。このようなカバー部材は、通常、キーボード等のキートップ配列と同一かつ同数（規定数）のキートップ部を有し、これらキートップ部の裏面に可動接点が、また、キートップ部の天面に図形や文字等が印刷される。
【０００３】ところで、上述したカバー部材は、回路基板と組み付けられて押釦スイッチを構成した状態で、キートップ部の天面がオペレータの指と接触する操作部（押圧面）として機能する。このため、押釦スイッチを長期間にわたって使用した場合等には、キートップの天面の図形や文字等がオペレータの指との接触で摩損し、図形等の視認性が損なわれることがあり、また、キートップ部が軟質のゴムであることから良好な指触感を得られないという欠点があった。
【０００４】そこで、文字や図形等の耐摩耗性の改善とともに指触感の改善を図ったカバー部材が種々提案され、この種のカバー部材として、特開平７－３０２５２６号公報、特開平６－２６７３６７号公報あるいは特開平８－６９７２７号公報等に記載されたものが知られる。例えば、特開平７－３０２５２６号公報には、ポリエチレンテレフタレート（ＰＥＴ）等の樹脂フィルムに複数の湾曲部を形成し、これら湾曲部内にポリカーボネート等の溶融樹脂を注入、充填し、この溶融樹脂を硬化させてなるカバー部材が記載される。
【０００５】また、特開平６－２６７３６７号公報および特開平８－６９７２７号公報には、樹脂フィルムに凸部を形成し、この凸部内に合成樹脂を充填硬化して一体化させるとともに、樹脂フィルムの凸部の周囲を小さな巾のヒンジ部を残して切り欠き部を形成し、樹脂フィルム上に凸部を挿通する穴が形成された樹脂の銘板を貼合し、この銘板により切り欠き部を覆うカバー部材が記載される。
【０００６】
【発明が解決しようとする課題】しかしながら、上述した各公報に記載のカバー部材はいずれも、樹脂フィルムに凹部（凸部、湾曲部）を形成し、この凹部内に樹脂を充填するため、キートップの押圧操作に対する反撥弾性特性やクリック感が樹脂フィルムの弾性特性に依存して操作特性の選択の自由度が小さく、また、繰り返し使用に対する耐久性も劣るという問題があった。
【０００７】すなわち、ＰＥＴ等の樹脂フィルムによってはゴム弾性が得られず、設定できるストロークも大きく制限されて設計の自由度が低下し、また、相当の耐久性を得るにはストロークを極めて小さくしなければなら

ず、満足すべき操作感を得ることが困難であった。この発明は、上記問題に鑑みてなされたもので、キートップの押圧操作に対する反撥弾性特性やクリック感等の設定に際して選択の自由度が大きく、良好な操作感が得られる押釦スイッチ用カバー部材と、押釦スイッチを提供することを目的とする。

【０００８】

【課題を解決するための手段】上記目的を達成するため、請求項１に記載の発明は、複数の可動凸部を一体に有するゴム弾性体のカバー基体と、天面の内面または外面に表示部を有する複数のキートップが前記カバー基体の複数の可動凸部に対応して膨出成形され、前記キートップをそれぞれ前記可動凸部と嵌合させて前記カバー基体と組み付けられる硬質樹脂のトップシートと、を備える押釦スイッチ用カバー部材であって、前記トップシートのキートップの周りに該キートップを中心として３４０°以上の角度範囲にわたって切り込みを形成した。

【０００９】そして、請求項２に記載の発明は、請求項１に記載の押釦スイッチ用カバー部材において、前記カバー基体の天面と前記トップシートのキートップ内底面のみを接着剤で接着してなる。

【００１０】また、請求項３に記載の発明は、複数の可動凸部を一体に有するゴム弾性体のカバー基体と、該カバー基体の複数の可動凸部にそれぞれ嵌合された硬質樹脂のキャップ状のキートップとを備える押釦スイッチ用カバー部材であって、前記カバー基体の可動凸部天面と前記キートップ内底面のみを接着剤で接着した。

【００１１】そして、請求項４に記載の発明は、請求項１、請求項２または請求項３に記載の押釦スイッチ用カバー部材において、前記キートップを透光性とするとともに、該キートップの内底面に記号・図形等の表示部を印刷形成してなる。また、請求項５に記載の発明は、請求項１、請求項２または請求項３に記載の押釦スイッチ用カバー部材において、前記カバー基体および前記キートップを透光性に構成するとともに、前記カバー基体の表面に遮光性着色層を形成し、前記凸部天面上の遮光性着色層を記号・図形形状に除去して表示部を形成した。

【００１２】押釦スイッチは、回路基板、カバー基体および硬質樹脂のトップシート（キートップ）を主要な要素として構成され、設けられる機器、例えば、携帯電話機やキーボード等のケーシング内に収容される。回路基板には、固定接点や周知の回路素子等が、また、照光式押釦スイッチを構成する場合はＬＥＤ等の発光体が設けられる。ケーシングは、データ入力用のキー数と同数（上述した規定数）の穴を有し、これらの穴にトップシートのキートップが突出する。

【００１３】カバー基体は、回路基板への支承部として機能するベース部、ベース部から突出する規定数の可動凸部、これら可動凸部とベース部を連続する薄肉のスカート部等を有し、直接、あるいは、皿バネ的な弾性変形特性を有するドーム部が形成されたクリック板を介して回路基板に組み付けられる。このカバー基体は、クリック板を介して回路基板に組み付けられる場合は可動凸部の裏面に押圧部が一体に、また、回路基板に直接に組み付けられる場合は回路基板の固定接点と接触可能な可動接点が導電性ゴム等で形成される。

【００１４】また、カバー基体は、ウレタンゴム、アクリルゴム、ブチルゴム、シリコーンゴム、イソプレンゴム、エチレン－プロピレン－ジエン三元共重合（ＥＰＤＭ）等の合成ゴムや天然ゴム、熱可塑性エラストマ、ポリエステル系若しくはウレタン系の熱可塑性エラストマ等のゴム弾性体（組成物）、特に、照光式の押釦スイッチを構成する場合は透光性のゴム組成物を用いて、圧縮成形や射出成形等で単独に、あるいは、キートップ（トップシート）をインサートとするインサート成形等により成形される。

【００１５】特に、キートップに表示部を設けて照光式の押釦スイッチを構成する場合は、カバー基体を透光性のゴム弾性体で構成し、さらに、キートップないしトップシートを透光性の皇室樹脂とし、キートップの内底面にその成形前に印刷等で表示部を形成し、カバー基体の可動凸部天面と対面する部分の少なくとも一部を除いて遮光性着色層を形成、あるいは、この遮光性着色層の非形成部分に透光性着色層を形成する。同様に、カバー基体に表示部を設けて照光式の押釦スイッチを構成する場合は、可動凸部天面の遮光性着色層をレーザー等で記号や図形状に除去して表示部を形成する。

【００１６】カバー基体への表示部の形成は、表面全面にスプレー塗装等で遮光性着色層を形成した後に可動凸部天面の遮光性着色層をレーザー照射等で文字等の形状に抜き、この抜き部に透光性着色層を形成すること、あるいは、基体表面全面にスプレー等で形成した後に可動凸部上の部分をレーザー等で除去すること等により行う。また、キートップへの表示部の形成は、硬質樹脂シートに長尺の状態で遮光性着色層を形成して文字等の形状の抜き部をレーザー照射や抜き文字印刷等で形成し、この抜き部に透光性着色層を印刷等で形成した後に圧空成形等でキートップを形成すること等により行う。

【００１７】硬質樹脂のトップシートは、熱硬化性樹脂や熱可塑性樹脂のシート（フィルム）、望ましくは、成形の容易さ等から熱可塑性樹脂のシート、例えば、ＰＥＴシート、ポリエチレン、塩化ビニル、スチロール、アクリル、ポリプロピレン、ポリカーボネート等の樹脂シート、特に、照光式の押釦スイッチを構成する場合は透光性のシートが用いられる。この硬質樹脂のトップシートは、カバー基体の可動凸部天面に記号や図形等の表示部を形成しない場合は、表示部を印刷等で形成した後に真空成形、圧空成形あるいはプレス成形等でキャップ（凹あるいは凸）状の規定数のキートップ等が表示部を内底面（裏面）に位置させて形成され、また、カバー基

体の可動凸部天面に表示部を形成する場合は、表示部を形成することなくキートップが形成される。

【００１８】キートップは、キャップ状、すなわち、表面側が閉止された有底筒状であって、カバー基体の可動凸部が嵌合、あるいは、相当のクリアランスをもって遊合して状態でカバー基体に取り付けられる。キートップは、フィルムから打ち抜き等で完全に分離された単独状態、周辺の少なくとも一部が連続して他の部分が切り込みにより分離されたシート状態で、望ましくは、切り込みが３４０°以上の角度範囲にわたって形成された状態、若しくは、連続部を１ｍｍ～２ｍｍ残した状態に形成される。このキートップは、少なくとも内底面が可動凸部の天面と、望ましくは、内面のみ（換言すれば、側部の変形を許容するため内側面を除いた部分）が可動凸部天面と接着剤で接着され、また、表面にハードコート、エンボスあるいは装飾用の加飾層の形成等の各種の表面処理が必要に応じて施される。

【００１９】そして、押釦スイッチとして完成した状態では、キートップはケーシングの穴からケーシング外へ押圧操作可能に突出する。特に、望ましい態様としては、フランジ部を有するトップシートのキートップは、内底面のみをカバー基体の可動凸部天面と接着させ、フランジ部がケーシングとカバー基体との間に挟持された状態で取り付けられる。

【００２０】

【作用】この発明にかかる押釦スイッチ用カバー部材は、ゴム弾性体のカバー基体の表面にキートップを有するトップシートあるいは硬質樹脂から成形されたキートップを可動凸部と固着させて設けるため、硬質指触感を得ることができ、また、反撥弾性特性等の設定の自由度も大きく、さらに、繰り返しの使用に対しても優れた耐久性が得られる。すなわち、キートップにより硬質の指触感を得、また、反撥弾性特性等はゴム弾性体のカバー基体により得るため、適正な反撥弾性特性が達成でき、優れたクリック感と耐久性が得られる。

【００２１】特に、キートップの周りに３２０°以上の切り込みを形成して、換言すれば、２０°以下の連続部（ヒンジ部）で連続させることで、トップシート（硬質樹脂シート）の変形が反撥弾性特性等に及ぼす影響をより小さくでき、また、キートップをその内底面とカバー基体の可動凸部天面のみを接着剤で接着させて設けることで、キートップの側部の変形が許容されるため、より適正な反撥弾性特性を得ることができる。なお、上記連続部の幅は、トップシートの耐久性と組付時の作業性より１ｍｍ～２０ｍｍが好ましい。さらに、表示部をキートップの内底面あるいはキートップにより被覆される可動凸部天面に設けることで、表示部の摩損を防止でき、表示部に優れた耐久性が得られる。

【００２２】またさらに、この発明にかかる押釦スイッチは、トップシートにフランジ部を形成し、このフランジ部をケーシングとカバー基体の間に挟持するため、高い気密性、水密性が得られ、また、照光式に構成した場合でもケーシング内部のＬＥＤ等が発する光が漏洩することを防止できる。

【００２３】

【実施の形態】以下、この発明の実施の形態を図面を参照して説明する。図１から図４はこの発明の一の実施の形態にかかる押釦スイッチ用カバー部材を示し、図１が同カバー部材を用いた押釦スイッチの模式断面図、図２がカバー基体を示す図、図３が硬質樹脂シートを示す図、図４が硬質樹脂シートの他の態様を示す図である。

【００２４】先ず、図１を参照して製造されたカバー部材を説明する。図１は押釦スイッチとして組み付けた状態を示し、図中、５は機器のケーシング、１０は回路基板、２０はクリック板、３０はカバー部材である。周知のように、ケーシング５は後述するキートップが貫通する複数の穴５ａを有し、回路基板１０はエポキシ樹脂等からなり、表面に固定接点１１とＬＥＤ等の発光体１２を有する。クリック板２０は、皿バネ的な弾性変形特性を有する複数のドーム部２１がカバー部材３０の後述する可動凸部に対応して表面側に膨出形成され、ドーム部２１の裏面に可動接点２２が設けられる。このクリック板２０は、ドーム部２１の表面頂部にカバー部材３０の押圧部が当接し、押圧部による押圧でドーム部２１が変形して可動接点２２が固定接点１１と接触する。

【００２５】カバー部材３０は、透光性のカバー基体４０の表面に透光性の硬質樹脂のトップシート５０を平面視矩形状に組み付けて構成され、数字、機能およびスクロール等の規定数のキーを有する。図２ａ，ｂに示すように、カバー基体４０は、シリコーンゴム組成物の圧縮成形や射出成形等により成形され、回路基板１０への支承部としてのベース部４１と、ベース部４１に薄肉部４３を介して連続する規定数の可動凸部４２とを一体に備える。このカバー基体４０は、可動凸部４２が略筒状をなして後述するトップシートのキートップに嵌合し、また、各可動凸部４２の裏面にドーム部２１を押圧可能に押圧部４４が一体に突設される。このカバー基体４０は、シリコーンゴム組成物を用いて圧縮成形や射出成形等で成形される。

【００２６】トップシート５０は、平面視形状がカバー基体４０と略同一の矩形状を有し、ＰＥＴ、ポリエチレンあるいはポリ塩化ビニル等の熱可塑性樹脂シートから圧空成形等で構成される。図３ａ，ｂ，ｃに示すように、トップシート５０には、規定数のキートップ５２がシート部５１（キートップを除いた部分）に成形され、これらキートップ５２の周りに２０°以下の角度θを除く範囲で切り込み５３が打抜等により形成される（角度θの範囲の連続する部分をヒンジ部５４と称する）。キートップ５２は、可動凸部４２が嵌合する表面側に凸のキャップ状であって、切り込み５３によりフランジ部５

２ａが形成される。

【００２７】また、トップシート５０には、裏面全面に遮光性着色層５６が形成され、キートップ５１内底面の遮光性着色層５６を記号や図形状に除去して表示部５７が形成され、また、この表示部５７に重ねて透光性着色層５８が形成される。遮光性着色層５６はカーボンブラック等の顔料が配合された遮光性のインクや塗料（樹脂組成物）を用いて印刷やスプレー塗装等でキートップ５２の成形前に形成され、表示部５７は遮光性着色層５６をレーザーにより文字等の形状に除去することで、あるいは、抜き文字印刷等で形成され、透光性着色層５８は透光性のインク等を用いてスクリーン印刷等で形成される。なお、図１、後述する図５ａおよび図６では、遮光性着色層５６や透光性着色層５８等の記載を省略している。

【００２８】このトップシート５０は、キートップ５２にそれぞれカバー基体４０の可動凸部４２が嵌合し、キートップ５２の内底面と可動凸部４２の天面が接着剤５５により接着固定される。なお、上述したヒンジ部５４は、その形成範囲が２０°以下の角度に限定されるものでなく、また、図４に示すように複数箇所に形成することも可能である。さらに、トップシート５０とカバー基体４０の接着部分も、キートップ５２の内底面と可動凸部４２の天面に限定されるものでなく、これらの部分に加えてシート部５１とベース４１を接着することも可能であり、またさらに、接触する面の全面を接着することも可能である。

【００２９】この実施の形態にあっては、図１に示すように、キートップ５２を押圧することで可動凸部４２が薄肉部４３を変形させて回路基板１０側に変位し、押圧部４４がクリック板２０のドーム部２１を押圧する。このため、クリック板２０は、ドーム部２１が皿バネ的な特性で変形し、可動接点２２が固定接点１１と接触して回路を開閉する。そして、この時、ドーム部２１の変形がキートップ５２の押圧操作に適正な抵抗感とクリック感を与える。

【００３０】ここで、キートップ５２は内底面のみが可動凸部４２と接着されているにすぎず、また、シート部５１とはヒンジ部５４でのみ連続する。このため、可動凸部４２が変位を生じた時には、キートップ５２は、ヒンジ部５４を屈曲させて可動凸部４２と一体に変位し、また、押圧力が過大で可動凸部４２自体が圧縮変形を生じた場合等は側部が径方向外側へ膨出するような変形を生じる。したがって、可動凸部４２の変位の特性、すなわち、キートップ５２の押圧操作特性は、キートップ５２の変位に大きな影響を受けることが無く、キートップ５２の反撥弾性特性をカバー基体３０とクリック板２０により決定でき、その設定の自由度が大きく、また、所望の特性への設定も容易に行え、さらに、繰り返しの使用に対する耐久性も改善できる。

【００３１】また、この押釦スイッチにあっては、オペレータの指等が直接に接触するキートップ５２はゴムに比較して硬質の熱可塑性樹脂から構成され、表示部５７がキートップ５２の裏面である内底面に印刷形成される。このため、硬質の指触感が得られ、また、繰り返し使用しても表示部５７が摩損することが無く、表示部５７に高い耐久性が達成される。

【００３２】図５ａ，ｂはこの発明の他の実施の形態にかかる押釦スイッチ用カバー部材を示し、図５ａが押釦スイッチの一部の模式断面図、図５ｂがキートップの拡大模式断面図である。なお、この実施の形態および後述する実施の形態においては前述した実施の形態と同一の部分には同一の番号を付して説明と図示を割愛する。

【００３３】この実施の形態は、独立した個々のキートップ５２、すなわち、シート部５１から完全に分離した個々のキートップ５２をカバー基体４０の可動凸部４２に嵌合させてキートップ５２の内底面と可動凸部４２の天面とを接着剤５５で接着する。キートップ５２には、裏面に遮光性着色層５６が形成され、内底面の遮光性着色層５６を文字等の形状に除去して表示部５７が形成され、表示部５７に重ねて透光性着色層５８が設けられる。また、キートップ５２は、フランジ部５２ａを有し、このフランジ部５２ａがケーシング５とカバー基体４０との間に挟持される。

【００３４】この実施の形態にあっても、キートップ５２が硬質の樹脂であるため、硬質指触感が得られ、また、キートップ５２が反撥弾性特性に大きな影響を及ぼさないため、特性設定の自由度が大きく、優れた耐久性が得られる。特に、この実施の形態は、キートップ５２のフランジ部５２ａをカバー基体４０とケーシング５との間に挟持するため、ケーシング５内部のＬＥＤの光の漏洩を防止でき、また、優れた水密性が得られる。

【００３５】また、このカバー部材３０は以下に述べるようにして製造する。すなわち、硬質樹脂シートに遮光性着色層５６を抜き文字状態に形成して表示部５７を設けた後、表示部５７上に透光性着色層５８を設け、次いで、圧空成形等でキートップ５２を成形し、キートップ５２を厳少幅の連続部（ヒンジ部５４）でシート部５１と連続する状態に打ち抜く。そして、カバー基体４０の各可動凸部４２天面に接着剤５５を塗布し、各可動凸部４２にヒンジ部５４で連続したキートップ５２を嵌合させて接着し、接着剤の硬化後にヒンジ部５４をＮ切断してシート部５１を引き剥がす。したがって、カバー基体４０へのキートップ５２の取付が容易に、例えば、各キートップ５２を治具等で一体的に保持して同時に取り付けることができ、製造工数を削減してコストの低減が図れる。

【００３６】なお、この発明は上述した実施の形態に限定されるものではなく、図６あるいは図７に示すようなカバー部材３０（押釦スイッチ）も達成できる。すなわ

ち、図６に示すカバー部材３０は、キートップ５２をフランジ部５２ａを有しない形状に成形し、カバー基体４０の可動凸部４２に嵌着する。このキートップ５２は、内底面のみ、あるいは、内側面と天面の全面が接着剤５５により可動凸部４２に接着される。

【００３７】また、図７に示すカバー部材３０は、図１の実施の形態において、硬質樹脂シート５０のキートップ５２内底面のみならずシート部５１もカバー基体４０の表面に接着剤５５（図中、×で示す）で接着する。この実施の形態は、硬質樹脂シート５０がカバー基体４０に強固に固着するため、より優れた耐久性と水密性が得られる。

【００３８】

【発明の効果】以上説明したように、請求項１に記載の発明は、ゴム弾性体で可動凸部を有するカバー基体を成形するとともに、硬質樹脂シートにキートップを膨出成形してトップシートを構成し、トップシートのキートップの周りに３２０°以上の範囲で切り込みを形成し、キートップを可動凸部に嵌合させてトップシートをカバー基体に取り付けるため、また、請求項３に記載の発明は、硬質樹脂シートから打抜分離されたキートップをカバー基体の可動凸部に取り付けるため、キートップの押圧操作に際して硬質指触感を得ることができるのみならず、押圧操作に際してキートップの変形等が反撥弾性特性に及ぼす影響を小さくでき、特性の設定に大きな自由度が得られ、また、繰り返しの使用に対する耐久性の低下も防止できる。

【００３９】特に、請求項２，３に記載の発明によれば、キートップのカバー基体の取付に際して、キートップの内底面と可動凸部の天面のみを接着剤で接着するため、押圧操作に際してキートップの側部の変形が許容され、キートップの変形が反撥弾性特性等に与える影響をより小さくできる。

【００４０】また、請求項６に記載の発明によれば、キートップにフランジ部を形成し、カバー部材をケーシングに組み込んだ状態でフランジ部をカバー基体とケーシングとの間に挟持するため、より高い水密性が得られ、また、照光式の押釦スイッチとして構成した場合にはケーシング内のＬＥＤ等の光の漏洩もより有効に防止できる。

【図面の簡単な説明】

【図１】この発明の一の実施の形態にかかる押釦スイッチ用カバー部材を組み込んだ押釦スイッチの一部の模式断面図である。

【図２】同押釦スイッチ用カバー部材のカバー基体を示し、ａが模式平面図、ｂがａのＡ－Ａ矢視模式断面図である。

【図３】同押釦スイッチ用カバー部材の硬質樹脂シートを示し、ａが模式平面図、ｂが一部拡大模式平面図、ｃがａのＢ－Ｂ矢視模式断面図である。

【図４】同硬質樹脂シートの他の態様を示す一部拡大模式平面図である。

【図５】この発明の他の実施の形態にかかる押釦スイッチ用カバー部材を示し、ａが同押釦スイッチ用カバー部材を組み込んだ押釦スイッチの一部の模式断面図、ｂが同カバー部材に用いる硬質樹脂シートの一部拡大模式断面図である。

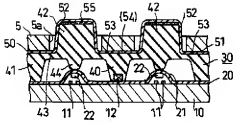
【図６】この発明のまた他の実施の形態にかかる押釦スイッチ用カバー部材を組み込んだ押釦スイッチの一部の模式断面図である。

【図７】この発明のさらに他の実施の形態にかかる押釦スイッチ用カバー部材を組み込んだ押釦スイッチの一部を拡大した模式断面図である。

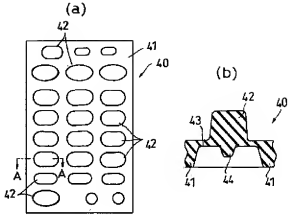
【符号の説明】

５	ケーシング
１０	回路基板
１２	ＬＥＤ（発光体）
２０	クリック板
２１	ドーム部
３０	カバー部材
４０	カバー基体
４１	ベース部
４２	可動凸部
４３	薄肉部
５０	トップシート
５１	シート部
５２	キートップ
５２ａ	フランジ部
５３	切り込み
５４	ヒンジ部（連続部）
５５	接着剤
５６	遮光性着色層
５７	表示部
５８	透光性着色層
θ	切り込みの形成範囲の角度

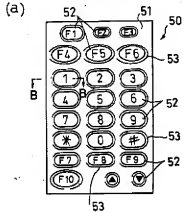
【図1】



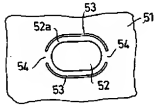
【図2】



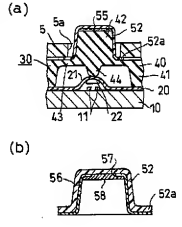
【図3】



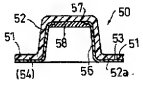
【図4】



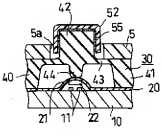
【図5】



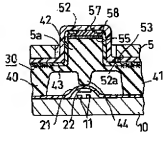
(c)



【図6】



【図7】



フロントページの続き

(72)発明者　森田　雄介
埼玉県大宮市吉野町１丁目406番地の１
信越ポリマー株式会社内